Saskatchewan
Research Council

SASKATOON SRC CLIMATOLOGICAL REFERENCE STATION ANNUAL SUMMARY, 1989

by

V. Wittrock
and E.E. Wheaton

SRC Technical Report No. 223

Publication E-2330-2-B-90

January, 1990

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ACKNOWLEDGEMENTS

The Saskatchewan Research Council (SRC) gratefully acknowledges the financial support of the Atmospheric Environment Service, Environment Canada, which supports in part the operations of the benchmark station through a contractual agreement.

The observing program owes much to the careful work of V. Wittrock, R. Begrand, R. Bouvier, R. Jahren, R. MacPherson, and J. Matamala and B. Smith.

Discussions with the staff of the Saskatoon Weather Office and K. Leek, Atmospheric Environment Service site inspection officer, have proven most helpful.

Technical drafting for this report was undertaken by Graphic Services.

T. Willett, D. Diduck and others from Departmental Services, SRC, provided the word processing for this report.

Enquiries concerning the climatological reference station data and its measurement programs are welcome. For further information, please contact:

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ABSTRACT

Data concerning temperature, precipitation, soil temperature, evaporation, windspeed, bright sunshine and solar radiation at the Saskatoon Climatological Reference Station (52°09'N, 106°36'W, 497 m MSL) are presented for the year 1989 and compared with the long term historic and standard period (1951-80) records.

1989 was a reprieve from the last three warm and dry years. 1989 recorded 384.8 mm of precipitation, which is 104% of normal and 99.1 mm above last year's value. Six had above normal precipitation with the greatest amount in May at 88.4 mm. May also had the greatest number of precipitation days at 10 days.

The amount of total evaporation recorded in 1989 was below last year's value by over 300 mm but still above the long term normal. The frost-free season was two days longer than normal, but much shorter than 1988's 139 days. The peak gust of wind was recorded in June with a velocity of 89 km/hr.

Mean monthly temperatures, remained high, in general, with eight months recording above normal mean values. The mean annual maximum and minimum temperatures were both above the yearly normal; the mean annual temperature was 0.5°C above normal. Saskatoon did have its extremes in temperature, however. The extreme maximum temperature of 37°C was recorded on July 21st and the extreme minimum (breaking a daily record of -38°C) was -40°C recorded on the 20th of December. The previous record for December is -43.9, recorded in 1892. This yearly temperature variation (over a five month span) was 77°C. No wonder some people dream of the snow in the hot summer and the beach in the frigid winter.

1989 was relatively good year for crop growth compared to previous years and resulted in a near average crop yield. However, the hot dry July and the wet fall contributed to a decrease in both the quantity and quality of some crop yields.

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	i
ABSTRACT	ii
HISTORY AND STATION LOCATION	1
FOOTNOTES TO CLIMATIC TABLES	3
Table 1. Annual Climatic Summary, Saskatoon SRC, 1989	7
Table 2. Monthly Weather Summary, Saskatoon SRC, January, 1989	8
Table 3. Monthly Weather Summary, Saskatoon SRC, February, 1989	9
Table 4. Monthly Weather Summary, Saskatoon SRC, March, 1989	10
Table 5. Monthly Weather Summary, Saskatoon SRC, April, 1989	11
Table 6. Monthly Weather Summary, Saskatoon SRC, May, 1989	12
Table 7. Monthly Weather Summary, Saskatoon SRC, June, 1989	13
Table 8. Monthly Weather Summary, Saskatoon SRC, July, 1989	14
Table 9. Monthly Weather Summary, Saskatoon SRC, August, 1989	15
Table 10. Monthly Weather Summary, Saskatoon SRC, September, 1989	16
Table 11. Monthly Weather Summary, Saskatoon SRC, October, 1989	17
Table 12. Monthly Weather Summary, Saskatoon SRC, November, 1989	18
Table 13. Monthly Weather Summary, Saskatoon SRC, December, 1989	19
Table 14. Soil Temperature and Snow Cover at Saskatoon SRC, January, 1989	20
Table 15. Soil Temperature and Snow Cover at Saskatoon SRC, February, 1989	20
Table 16. Soil Temperature and Snow Cover at Saskatoon SRC, March, 1989	21
Table 17. Soil Temperature and Snow Cover at Saskatoon SRC, April, 1989	21
Table 18. Soil Temperature and Snow Cover at Saskatoon SRC, May, 1989	22

TABLE OF CONTENTS (Continued)

Page

Table 19. Soil Temperature and Snow Cover at Saskatoon SRC, June, 1989 22

Table 20. Soil Temperature and Snow Cover at Saskatoon SRC, July, 1989 23

Table 21. Soil Temperature and Snow Cover at Saskatoon SRC, August, 1989 23

Table 22. Soil Temperature and Snow Cover at Saskatoon SRC, September, 1989 24

Table 23. Soil Temperature and Snow Cover at Saskatoon SRC, October, 1989 24

Table 24. Soil Temperature and Snow Cover at Saskatoon SRC, November, 1989 25

Table 25. Soil Temperature and Snow Cover at Saskatoon SRC, December, 1989 25

Table 26. Diffuse Solar Radiation (MJ m^{-2}) at Saskatoon SRC, 1989 26

Table 27. Global Solar Radiation (MJ m^{-2}) at Saskatoon SRC, 1989 28

Table 28. Some Significant Climatic Events, 1989 30

Table 29. Times of Sunrise at Saskatoon, 1989 31

Table 30. Times of Sunset at Saskatoon, 1989 32

Figure 1. Year 1989 Daily Temperature and Cumulative Precipitation 33

HISTORY AND STATION LOCATION

The first meteorological observations appear to have been taken at or near Saskatoon by the Royal Northwest Mounted Police in 1889. At first only temperatures were recorded. There were a number of changes made in the coordinates and as a result there is some disagreement in the early records as to the exact location of the weather observing point. The bulk of the evidence, however, indicates that the location was 52°15'N and 106°20'W, elevation 480 m above sea level. This would place it at Clark's Crossing, on the South Saskatchewan River, approximately 16 km north and east of the centre of the present City of Saskatoon. At that time there was a settlement at Clark's Crossing and also about 10 or 15 families on either side of the river at Saskatoon.

Not too much is known about the early observers. However, the records show that a Major T.H. Keenan took the observations from March, 1892 until March, 1895. Mr. George Will was the observer from January, 1897 until April, 1897. It is thought that Thomas H. Copeland was involved in the observational program from 1895 to May 1, 1901, at which time it was taken over by Mr. Eby, senior. Continuous observations were taken by the Eby's at a site on 8th Street until October 31, 1942, when the station was closed. Mr. Eby continued the program until his death in 1921. His daughter, Miss E.S. Eby, recorded the observations until April, 1931 and was replaced by her brother, J.M. Eby, who continued the program until the station was closed. The Eby station recorded temperature, precipitation and weather notes on fog, thunderstorms, winds and any unusual weather phenomena. Reports were made twice daily, morning and evening.

In 1916 a climatological station was established by the Physics Department of the University of Saskatchewan and continuous observations were kept twice daily until January 15, 1965. The long time observer at this site was Mr. Sidney Cox. The Saskatchewan Research Council took over the program in the fall of 1963 at our newly established Climatological Reference Station.

The location of the Saskatchewan Research Council's Climatological Reference Station is latitude 52°09'N and longitude 106°36'W and the elevation is 497 m above mean sea level*. The long time observer (16 years) at this present site was Mr. Joe Calvert, who retired from the program in August, 1983. The observers for 1989 were Virginia Wittrock, Ray Begrand, Rod Bouvier, Rolf Jahren, Bob MacPherson, Julio Matamala, and Brett Smith.

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*From various sources including the Physical Environment of Saskatoon, Canada (E.A. Christiansen ed. 1970) and 1974 Annual Meteorological Summary, Saskatoon, Saskatchewan, Environment Canada, Atmospheric Environment Service.

FOOTNOTES TO CLIMATIC TABLES 1 TO 13

1 The values are calculated using the monthly summaries, January to December, 1989 (Tables 2 to 13).

2 In climatology it is often useful to make spatial comparisons of particular element values over a common time period. At an interior continental site such as Saskatoon, a period of 30 years is required to produce statistically stable estimates of the more variable elements. To facilitate spatial comparisons, the World Meteorological Organization currently recommends the standard normal period January 1, 1951 to December 31, 1980 for data analysis. Items in this column conform to this standard, except where noted.

3 Temporal comparisons at a point are also of value in some types of climatic studies. Therefore, it is desirable to produce the maximum length of reliable climatic record to carry out studies over a period of time. Data in this column are drawn from the following data sets:

Saskatoon SRC	1964 to 1989
Saskatoon U. of S.	1916 to 1963
Saskatoon	1892 to 1915

Station locations, exposures and measurement procedures were subject to change during this time period. Data presented in this column are unadjusted and users are cautioned accordingly.

4 The mean annual temperature is defined as the average of the daily mean temperatures for one year. In the monthly summaries (Tables 2 to 13) the daily mean temperature reported is the average of the daily mean temperatures for one month under consideration. In turn, the daily mean temperature for a particular day is defined as the arithmetic mean of the daily maximum temperature and the daily minimum temperature for the date. The normal records used for comparison purposes are those published in Volume Two of the Atmospheric Environment Service publication "Canadian Climate Normals, 1951-1980, Temperature".

5 The mean maximum temperature tabulated is the mean of the daily maximum temperatures for one year in the case of Table 1 and for particular months in the cases of Tables 2 to 13. For details concerning measurement procedures, the reader is referred to the Atmospheric Environment Service publication Manual of Climatological Observations, second edition, January, 1978. The normal values are published in Volume Two of the Canadian Climate Normals (note 4).

6 The mean minimum temperature as tabulated is defined as the mean of the daily minimum temperatures averaged over the appropriate time periods. Refer to note 5 above concerning measurement procedures and normals.

7 The word "extreme" refers to the highest or lowest value of a particular element recorded during the period in question. The highest temperature recorded at Saskatoon SRC during 1988 was 41.0°C. This becomes the new extreme as the highest value previously recorded at Saskatoon was 40.0°C (see Table 1).

8 A day with frost is recorded on each occasion when the daily minimum temperature is equal to or less than 0°C.

9 A heating degree-day (HDD) is an index of the heating requirement to achieve a stipulated comfort value in an indoor environment. For most purposes, a temperature of less than 18°C is considered uncomfortable and supplementary heating is required. On a specific day, the amount by which 18°C exceeds the daily mean temperature defines the number of heating degree-days for that day. Mathematically:

HDD = (18°C - T), for that day,
where T = daily mean temperature in °C
If T is equal to or greater than 18°C, HDD = 0.

Monthly and annual values of HDD are obtained by summing daily values. The normal used for comparison purposes is the adjusted normal published in the Atmospheric Environment Service publication Volume Four of the "Canadian Climate Normals, 1951-1980, Degree Days". The procedure used to adjust the means for stations with five to nineteen years of data is indicated in this volume. An adjustment is required to make the mean comparable to the thirty year normal.

10 In order for plant growth to proceed, air temperature must exceed a critical value appropriate to the plant species in question. For many members of the grass family, including most commercial cereals grown on the prairies, a base temperature of 5.0°C has been established. On a specified day, the difference between the daily mean temperature and the 5.0°C base temperature defines the number of growing degree-days (GDD). Mathematically:

GDD = (T - 5.0°C), for that day,
where T = daily mean temperature in °C
If T is equal to or less than 5.0°C, GDD = 0.

Daily GDD values are summed to provide totals for the appropriate month, growing season or year. The normal value used for comparison is given in Volume Four of the "Canadian Climate Normals, 1951-1980, Degree Days".

11 Total precipitation is the sum of the daily rainfall and daily snowfall amounts recorded. The snowfall component of precipitation is recorded as an equivalent amount of liquid water. For particulars on precipitation measurement procedures and instruments, the reader is referred to the Atmospheric Environment Service publication Manual of Climatological Observations, second edition, January, 1978. The notation T in this column refers to a trace of pre-

cipitation (less than 0.2 mm water equivalent). The normal records used for comparison purposes are those published in Volume Three of the Atmospheric Environment Service publication "Canadian Climate Normals, Precipitation, 1951-1980".

12 Note that prior to 1960, measurement of snowfall was accomplished using snow rulers set vertically in the ground to obtain the thickness of the newly deposited layer. In obtaining precipitation values a standard water equivalent of one inch of snow yielding one-tenth inch of water was assumed. Since these measurements were inaccurate due to snow drifting, compaction and varying water equivalent, the Nipher snow gauge which actually catches snow has been employed at a number of stations (including Saskatoon SRC) in more recent years.

13 A precipitation day is recorded on occasions when the amount of precipitation in a 24-hour period equals or exceeds 0.2 mm water (0.01 inch in English units). If both rain and snow occur on the same day, a snow day, a rain day and a precipitation day are all recorded. If only one form of precipitation occurs on a specified date, a precipitation day, a rain day or a snow day are recorded appropriately. Beginning in 1974, observations at Saskatoon SRC refer to the calendar day. Previous to 1974, the so-called climatological day, beginning at 9 a.m. standard time on the date of reference and ending at 9 a.m. the next morning, was employed in record-keeping. An asterisk (*) appearing in the normal column denotes the occurrence of measurable precipitation on one or more occasions but the 30-year mean when calculated amounts to less than a trace.

14 Evaporation measurements are carried out in the period May 1 to October 31 (weather permitting) only, using the International Hydrological Decade class A pan. The data reported is the sum of the daily net evaporation. Particulars of the measurement procedure are contained in the Atmospheric Environment Service publication "Evaporation", May, 1978. The data base available for comparison is the Saskatoon SRC record for the period 1964 to 1980. The notation M refers to missing data.

15 The mean wind speed value reported is the mean of the hourly wind speeds for the period in question. Average hourly wind speeds are obtained from recording instruments. The anemometer employed is a propeller-type aerofoil at a height of 10 m. Normals used for comparison purposes are those of Saskatoon Airport, from the Atmospheric Environment Service publication "Canadian Normals, Volume 5, Wind 1951-1980".

16 Peak gust refers to the highest instantaneous value recorded by the anemometer system for the period of reference, irrespective of direction and/or duration. Comparison is again with published data for Saskatoon Airport.

17 Total bright sunshine is the sum of the daily bright sunshine values in hours and tenths of hours as recorded by a Campbell-Stokes

sunshine recorder. Atmospheric Environment Service publication, "Bright Sunshine, 1951-1980", Volume 7 supplies information on measurement procedures and normals respectively.

18 Percent possible bright sunshine hours refers to the ratio of measured bright sunshine hours to total possible daylight hours in a given period, expressed as a percentage.

19 Total global solar radiation is the sum of the daily values of short wave solar radiation recorded during the period in question. Measurements are carried out on a horizontal surface at the ground and integrated over the whole celestial dome, summing the diffuse and direct components of the solar beam. The measuring instrument is a temperature-compensated Eppley pyranometer. The standard metric unit of measurement is the megajoule per square metre ($MJ\ m^{-2}$). (To facilitate comparison with past years' data: 1.0 $MJ\ m^{-2}$ = 23.895 langleys). Comparison is provided with a provisional normal based on six years of data (1975-1980). Diffuse solar radiation is also recorded (Table 26). The instrument used is an Eppley pyranometer with a shade ring.

20 The year/day entry appearing in Tables 2 to 13 refers to the year and day on which an extreme event occurred. Reference to the month appears in the table heading. For example, referring to Table 2, the warmest day in January, 1988 was the 15th with a high temperature of 2.0°C, while the warmest January day on record was January 30, 1931 with a high temperature of 10.0°C.

21 Due to missing observations, faulty instrument calibration, lost records, etc., only partial data are available especially during the period 1892 to 1915. The number of years of useful record is therefore cited.

22 Soil temperature, under a short grass surface with normal snow accumulation, is measured according to procedures outlined in the Atmospheric Environment Service publication "Soil Temperature", January 1, 1976. Depths below surface at which soil temperature measurements are made are: 5 cm, 10 cm, 20 cm, 50 cm, 100 cm, 150 cm and 300 cm. Since soil temperature is affected by profile structure and water content, extrapolation of the measured data is difficult.

Table 1. Annual Climatic Summary, Saskatoon SRC, 1988.

	1989[1] Values	1988 Values	Normals[2] (1951-80) and Extremes[3] (1892-1988)
Mean Annual Temperature[4] (°C)	2.3	3.9	1.8
Mean Maximum Temperature[5] (°C)	8.3	10.1	7.5
Mean Minimum Temperature[6] (°C)	-3.8	-2.3	-4.0
Extreme Maximum Temperature[7] (°C)	37.0 (July)	41.0 (June)	41.0 (June)
Extreme Minimum Temperature[7] (°C)	-40.0 (Dec.)	-39.5 (Feb.)	-50.0 (Feb.)
Days with Frost[8]	202	197	199
Heating Degree-Days[9] (18°C base)	5789.5	5371	6029
Growing Degree-Days[10] (5°C base)	1729.5	2003	1636
Total Precipitation[11] (mm)	384.8	285.7	370.5
Total Rainfall[11] (mm)	294.8	194.8	243.0
Total Snowfall[12] (cm)	92.5	90.9	118
Greatest 24-hr Precipitation (mm)	30.0 (June)	25.1 (July)	99.4 (June)
Greatest 24-hr Rainfall (mm)	30.0 (June)	25.1 (July)	99.4 (June)
Greatest 24-hr Snowfall (cm)	13.0 (Jan.)	8.8 (Dec.)	36.7 (Oct.)
Precipitation Days[13]	93	83	116.0
Rainfall Days[13]	59	49	59
Snowfall Days[13]	36	36	62
Total Evaporation[14] (mm)	1041.4 (May-Oct.)	1346.6 (May-Oct.)	717.6 (May-Oct.)
Mean Wind Speed[15] (km/hr)	24	17.2[a]	17.5[b]
Peak Wind Gust[16] (km/hr)	89 (June)	77 (Sept.)	151[b] (Aug.)
Total Bright Sunshine[17] (hr)	2380.7	2382.2	2449.7
Total Global Radiation[19] (MJ m^{-2})	5213.5	4809.9	-
Total Diffuse Radiation[19] (MJ m^{-2})	1699.1	1502.4	-

[a]missing 1 month
[b]information from Saskatoon Airport records

SASKATCHEWAN RESEARCH COUNCIL
CLIMATE REFERENCE STATION
LOCATION: 52°09'N 106°36'W 497 m MSL
MONTHLY WEATHER SUMMARY FOR
JANUARY, 1989

Element	1989 Value	1988 Value	Mean or Extreme Value 1951-1980[2]	Extreme All Years[3]
Monthly Mean Temperature[4] (°C)	-13.6	-17.2	-19.1	
Monthly Mean Maximum Temperature[5] (°C)	-8.1	-11.5	-14.2	
Monthly Mean Minimum Temperature[6] (°C)	-19.6	-22.8	-23.9	
Extreme Maximum Temperature[7] (°C)	4.0	2.0	6.1	10.0
Year/Day(s)[20]	1989/26 & 27	1988/15	1968/23 and 1973/15	1931/30
Years of Record[21]	1	1	17	91
Extreme Minimum Temperature[7] (°C)	-37.5	-37.0	-43.9	-48.9
Year/Day(s)[20]	1989/9	1988/5	1966/22 and 1969/29	1893/31
Years of Record[21]	1	1	17	91
Days with Frost[8]	31	31	31	
Heating Degree-Days[9] (18°C base)	959.5	1095.5	1149.0	
Growing Degree-Days[10] (5°C base)	0.0	0.0	0.0	
Total Precipitation[11] (mm)	32.3	14.6	22.6	
Total Rainfall[11] (mm)	4.6	0.0	0.1	
Total Snowfall[12] (cm)	27.7	14.6	21.2	
Greatest 24-hour Precipitation (mm)	15.4	4.4	12.4	30.5
Year/Day(s)[20]	1989/30	1988/22	1969/11	1893/23
Years of Record[21]	1	1	17	91
Greatest 24-hour Rainfall (mm)	2.4	0.0	1.8	2.4
Year/Day(s)[20]	1989/30	--	1976/27	1989/30
Years of Record[21]	1	1	17	91
Greatest 24-hour Snowfall (cm)	13.0	4.4	12.4	30.5
Year/Day(s)[20]	1989/30	1988/22	1969/11	1893/23
Years of Record[21]	1	1	17	91
Precipitation Days[13]	7	6	13	
Rainfall Days[13]	2	0	*	
Snowfall Days[13]	6	6	13	
Total Evaporation[14] (mm)	--	--	May-Sept.	
Mean Wind Speed[15] (km/hr)	27.2[b]	12.8[a]	16.8	
Peak Gust Speed[16] (km/hr)	74.0	68.0	97.0	
Total Bright Sunshine[17] (hr)	100.3	107.9	103.0	
Percent Possible Bright Sunshine[18]	39	42	40	
Total Global Radiation[19] (MJ m^{-2})	209.3	129.7	132.6	
Total Diffuse Radiation[19] (MJ m^{-2})	70.8	61.8	--	
Mean Soil Temperature[22] (°C) (10, 50 cm)	-8.1, -3.3	-10.7, -3.5	-8.7, -3.8	
Mean Soil Temperature[22] (°C) (150, 300 cm)	2.1, 4.8	2.4, 5.2	2.1, 4.5	

SUMMARY:

[a] 3 days missing data

[b] 7 days missing data

January was a month for temperature extremes (4 to -37.5) although the majority of it was well above normal. The mean temperature (-13.6) was 5.5°C warmer than normal. The warmer than usual temperature contributed to the low heating degree value of 959.5. January also saw extremes in the amount of precipitation. The majority of the month was dry with only 2.2 cm of snow falling but from the 29th to the 31st there had been a total of 4.6 mm of rain and 25.5 cm of snow. A new record was set for a one day rainfall amount (2.4 mm). The previous record was sent on January 20, 1947 with 1.8 mm of rain. January was also an extremely windy month with a mean wind speed of 27.2 km/hr compared to the normal 16.8 km/hr. The peak wind speed of 74 km/hr occurred on the 19th and 29th. The amount of bright sunshine was only 1% less than normal. Surface soil temperatures (150 - 300 cm) were near normal. Frost has penetrated to a depth of between 100 to 150 cm.

January, 1989, came in cold and went out cold with a lot of warmth inbetween. What most people will remember, however, will be the rain and the ice that resulted from it.

SASKATCHEWAN RESEARCH COUNCIL
CLIMATE REFERENCE STATION
LOCATION: 52°09'N 106°36'W 497 m MSL
MONTHLY WEATHER SUMMARY FOR
FEBRUARY, 1989

Element	1989 Value	1988 Value	Mean or Extreme Value 1951-1980[2]	Extreme All Years[3]
Monthly Mean Temperature[4] (°C)	-16.8	-12.9	-14.5	
Monthly Mean Maximum Temperature[5] (°C)	-11.7	-7.0	-9.3	
Monthly Mean Minimum Temperature[6] (°C)	-21.9	-18.7	-19.7	
Extreme Maximum Temperature[7] (°C)	1.0	7.5	6.1	12.8
Year/Day(s)[20]	1989/24	1988/26	1968/29	1931/19
Years of Record[21]	1	1	17	93
Extreme Minimum Temperature[7] (°C)	-37.5	-39.5	-41.1	-50.0
Year/Day(s)[20]	1989/1	1988/3&10	1972/6	1893/1
Years of Record[21]	1	1	17	93
Days with Frost[8]	28	29	28	
Heating Degree-Days[9] (18°C base)	971.0	902.5	920.4	
Growing Degree-Days[10] (5°C base)	0.0	0.0	0.0	
Total Precipitation[11] (mm)	7.4	10.3	21.9	
Total Rainfall[11] (mm)	0.0	0.0	0.4	
Total Snowfall[12] (cm)	7.4	10.3	18.5	
Greatest 24-hour Precipitation (mm)	3.0	4.5	14.2	20.3
Year/Day(s)[20]	1989/26	1988/13	1979/13	1918/7
Years of Record[21]	1	1	17	92
Greatest 24-hour Rainfall (mm)	0.0	0.0	1.8	8.1
Year/Day(s)[20]	--	--	1968/26	1953/3
Years of Record[21]	1	1	17	93
Greatest 24-hour Snowfall (cm)	3.0	4.5	14.2	20.3
Year/Day(s)[20]	1989/26	1988/13	1973/13	1918/7
Years of Record[21]	1	1	17	92
Precipitation Days[13]	2	5	11	
Rainfall Days[13]	0	0	*	
Snowfall Days[13]	2	5	10	
Total Evaporation[14] (mm)	--	--	--	
Mean Wind Speed[15] (km/hr)	26.8[a]	13.7[b]	16.4	
Peak Gust Speed[16] (km/hr)	65.9	67.0	85.0	
Total Bright Sunshine[17] (hr)	176.2	157.3	135.1	
Percent Possible Bright Sunshine[18]	64.3	57.0	49.0	
Total Global Radiation[19] (MJ m^{-2})	277.6[c]	210.9	232.9	
Total Diffuse Radiation[19] (MJ m^{-2})	94.5[c]	87.0	--	
Mean Soil Temperature[22] (°C) (10, 50 cm)	-7.2, -3.1	-7.9, -3.5	-7.3, -4.1	
Mean Soil Temperature[22] (°C) (150, 300 cm)	1.2, 3.6	1.0, 3.6	1.0, 3.2	

[a] 1 day missing data; [b] 4 days missing data; [c] 3 days missing data

SUMMARY:

February was a sunny cold month. It had a monthly mean temperature that was 2.3°C below normal, with a mean maximum 2.4°C below and the mean minimum 2.2°C below the normal temperatures. Fifteen of the 28 days were below normal in temperature. Daily minimum temperatures were less than -30°C for seven days during the month. If February 1989 is compared with February 1988, 1989 was nearly 4°C cooler on average. An extremely high number of total possible bright sunshine hours were recorded - 41.1 hours more than normal. The low temperatures of February felt even colder when the wind speed was considered. February had a high mean wind speed (26.8 km/hr). From the mean wind speed and the mean temperature the wind chill factor would have been around 1750 watts/m^2 for most of the month. February saw below normal amounts of precipitation with only 7.4 mm. February normally receives 21.9 mm, the majority of which comes as snowfall. Soil temperatures were above normal for all four levels.

February was very sunny, but with the clear windy days came continuous cold periods.

SASKATCHEWAN RESEARCH COUNCIL
CLIMATE REFERENCE STATION
LOCATION: 52°09'N 106°36'W 497 m MSL
MONTHLY WEATHER SUMMARY FOR
MARCH, 1989

Table 4.

Element	1989 Value	1988 Value	Mean or Extreme Value 1951-1980[2]	Extreme All Years[3]
Monthly Mean Temperature[4] (°C)	-10.1	-3.9	-8.5	
Monthly Mean Maximum Temperature[5] (°C)	-5.2	1.0	-3.5	
Monthly Mean Minimum Temperature[6] (°C)	-15.0	-8.8	-13.6	
Extreme Maximum Temperature[7] (°C)	8.0	10.0	15.0	22.8
Year/Day(s)[20]	1989/31	1988/31	1973/24	1910/23
Years of Record[21]	1	1	17	93
Extreme Minimum Temperature[7] (°C)	-30.5	-21.5	-38.9	-43.3
Year/Day(s)[20]	1989/2	1983/13	1972/2	1897/14
Years of Record[21]	1	1	17	93
Days with Frost[8]	31	31	31	
Heating Degree-Days[9] (18°C base)	872.5	684.5	826.0	
Growing Degree-Days[10] (5°C base)	0.0	0.0	0.9	
Total Precipitation[11] (mm)	9.8	38.0	22.3	
Total Rainfall[11] (mm)	3.4	1.0	1.1	
Total Snowfall[12] (cm)	6.4	37.0	19.5	
Greatest 24-hour Precipitation (mm)	4.0	8.4	32.0	32.0
Year/Day(s)[20]	1989/11	1988/26	1967/30	1967/30
Years of Record[21]	1	1	17	88
Greatest 24-hour Rainfall (mm)	2.8	1.0	5.6	7.4
Year/Day(s)[20]	1989/10	1988/26	1968/3	1938/28
Years of Record[21]	1	1	17	93
Greatest 24-hour Snowfall (cm)	4.0	8.4	32.0	32.0
Year/Day(s)[20]	1989/11	1988/26	1967/30	1967/30
Years of Record[21]	1	1	17	88
Precipitation Days[13]	7	10	10	
Rainfall Days[13]	2	1	1	
Snowfall Days[13]	5	10	10	
Total Evaporation[14] (mm)	--	--	(May-Sept.)	
Mean Wind Speed[15] (km/hr)	24.6	15.2	17.5	
Peak Gust Speed[16] (km/hr)	75.0	72.0	93.0	
Total Bright Sunshine[17] (hr)	185.5	138.4	190.0	
Percent Possible Bright Sunshine[18]	51	38	52	
Total Global Radiation[19] (MJ m^{-2})	462.7	352.1	422.9	
Total Diffuse Radiation[19] (MJ m^{-2})	134.6	163.4	--	
Mean Soil Temperature[22] (°C) (10, 50 cm)	-5.9, -2.8	-1.1, 0.2	-3.5, -2.1	
Mean Soil Temperature[22] (°C) (150, 300 cm)	0.6, 2.7	1.1, 2.9	0.5, 2.5	

SUMMARY:

March, 1989 saw well below normal temperatures and only 44% of normal precipitation. The monthly mean temperatures were all about 1.5°C below normal and over 6°C below the mean monthly temperatures recorded last March. The highest temperature recorded was 8°C on the 31st of the month with the lowest of -30.5°C recorded on the 2nd. The 9.8 mm of precipitation that fell was well below the normal of 22.3 mm. The precipitation came as both snow (4.0 cm) and rainfall (2.8 mm). March's mean wind speed was well above normal at 24.6 km/hr with a peak gust of 75 km/hr occurring on the 6th of the month. The amount of bright sunshine recorded was only 4.5 hours below normal. The 10 and 50 cm mean soil temperatures were well below normal but the 150 and 300 cm mean soil temperatures were 0.1 and 0.2 degrees above normal respectively.

March came in like a lion with cold temperatures (18 out of 31 days were below normal) but went out like a lamb with a balmy 8°C on the 31st. March's lion and lamb were not influenced by precipitation because of its sparse amounts.

SASKATCHEWAN RESEARCH COUNCIL
CLIMATE REFERENCE STATION
LOCATION: 52°09'N 106°36'W 497 m MSL
MONTHLY WEATHER SUMMARY FOR
APRIL, 1989

Element	1989 Value	1988 Value	Mean or Extreme Value 1951-1980[2]	Extreme All Years[3]
Monthly Mean Temperature[4] (°C)	4.7	5.7	3.4	
Monthly Mean Maximum Temperature[5] (°C)	11.8	13.2	9.0	
Monthly Mean Minimum Temperature[6] (°C)	-2.4	-1.8	-2.3	
Extreme Maximum Temperature[7] (°C)	28.0	28.0	30.6	33.0
Year/Day(s)[20]	1989/21	1988/29	1977/26	1952/28
Years of Record[21]	1	1	17	92
Extreme Minimum Temperature[7] (°C)	-10.5	-8.0	-27.8	-28.3
Year/Day(s)[20]	1989/16 & 17	1988/21 & 22	1979/1	1893/1954
Years of Record[21]	1	1	17	92
Days with Frost[8]	25	22	22	
Heating Degree-Days[9] (18°C base)	377.0	371.0	440.0	
Growing Degree-Days[10] (5°C base)	37.0	69.0	47.0	
Total Precipitation[11] (mm)	3.0	3.5	21.4	
Total Rainfall[11] (mm)	1.0	0.3	10.7	
Total Snowfall[12] (cm)	2.5	3.2	10.0	
Greatest 24-hour Precipitation (mm)	2.5	3.2	19.3	30.2
Year/Day(s)[20]	1989/7	1988/23	1968/20	1955/19
Years of Record[21]	1	1	17	92
Greatest 24-hour Rainfall (mm)	0.5	0.2	11.7	26.7
Year/Day(s)[20]	1989/13	1988/6	1964/25	1926/23
Years of Record[21]	1	1	17	92
Greatest 24-hour Snowfall (cm)	2.5	3.2	18.0	20.3
Year/Day(s)[20]	1989/7	1988/23	1968/20	1942/5
Years of Record[21]	1	1	17	92
Precipitation Days[13]	4	2	7	
Rainfall Days[13]	3	1	5	
Snowfall Days[13]	1	1	4	
Total Evaporation[14] (mm)	--	--	(May-Sept.)	
Mean Wind Speed[15] (km/hr)	27.2	14.6*	19.0	
Peak Gust Speed[16] (km/hr)	85	61	108	
Total Bright Sunshine[17] (hr)	277.4	257.9**	232.0	
Percent Possible Bright Sunshine[18]	67	62	56	
Total Global Radiation[19] (MJ m^{-2})	600.5	516	519	
Total Diffuse Radiation[19] (MJ m^{-2})	164.7	161	--	
Mean Soil Temperature[22] (°C) (10, 50 cm)	3.5, 3.4	5.2, 4.3	4.0, 2.0	
Mean Soil Temperature[22] (°C) (150, 300 cm)	1.5, 2.4	2.5, 2.8	0.9, 2.1	

*3 days missing data

**includes automatic data (8th - 30th)

SUMMARY:

April 1989 had a mean temperature that was 1.3°C above normal. The mean maximum temperature was also above normal but the mean minimum temperature was near normal. The extreme maximum temperature equalled last years of 28°C. The extreme minimum temperature of -10.5°C was nowhere near the record minimum of -28.3°C recorded in 1954. There were 25 days this month that received frost -- three more than usual. The number of growing degree-days in April 1989 was 32 less than last year and 10 less than normal. The amount of precipitation in April was even worse than last year. Last April had 3.5 mm of precipitation, this April received only 3.0 mm of precipitation. The majority of this small amount of precipitation came in the form of snowfall on the 7th of the month. April continued to see a high amount of wind. The mean monthly maximum wind was 27.2 km/hr while the normal is 19.0 km/hr. The peak gust was 85 km/hr occurring on the 15th of April. A large amount of sunshine was received in April; 45.4 hours more than the normal amount was recorded. The soil temperatures were all above normal except for the 10 cm depth which was 0.5°C below normal. The other three levels ranged from 0.3 to 0.6°C above normal.

April was a very windy, sunny, cool, and extremely dry month. April, 1989 has replaced 1988 as being the second driest month since 1941. (The driest was 1952 with only 2.2 mm of precipitation.) The windy dry weather did not live up to the myth of "April showers brings May flowers." There were very few showers but hopefully the May flowers will come.

SASKATCHEWAN RESEARCH COUNCIL
CLIMATE REFERENCE STATION
LOCATION: 52°09'N 106°36'W 497 m MSL
MONTHLY WEATHER SUMMARY FOR
MAY 1989

Element	1989 Value	1988 Value	Mean or Extreme Value 1951-1980[2]	Extreme All Years[3]
Monthly Mean Temperature[4] (°C)	11.5	15.5	11.2	
Monthly Mean Maximum Temperature[5] (°C)	18.1	23.5	18.1	
Monthly Mean Minimum Temperature[6] (°C)	4.8	7.5	4.3	
Extreme Maximum Temperature[7] (°C)	27.5	35.0	34.0	37.2
Year/Day(s)[20]	1989/7&10	1988/30	1980/21	1936/27
Years of Record[21]	1	1	17	92
Extreme Minimum Temperature[7] (°C)	-6.5	-1.0	-10.0	-12.8
Year/Day(s)[20]	1989/5	1988/2	1967/2	1907/6
Years of Record[21]	1	1	17	92
Days with Frost[8]	3	1	6	
Heating Degree-Days[9] (18°C base)	198.0	101.5	216.0	
Growing Degree-Days[10] (5°C base)	188.5	316.5	199.0	
Total Precipitation[11] (mm)	88.4	14.1	39.6	
Total Rainfall[11] (mm)	88.4	14.1	37.7	
Total Snowfall[12] (cm)	0.0	0.0	1.8	
Greatest 24-hour Precipitation (mm)	21.0	5.6	33.8	51.3
Year/Day(s)[20]	1989/12	1988/29	1975/19	1909/30
Years of Record[21]	1	1	17	92
Greatest 24-hour Rainfall (mm)	21.0	5.6	33.8	51.3
Year/Day(s)[20]	1989/12	1988/29	1975/19	1909/30
Years of Record[21]	1	1	17	92
Greatest 24-hour Snowfall (cm)	0	0	4.3	26.2
Year/Day(s)[20]	--	--	1969/14	1983/10
Years of Record[21]	1	1	17	92
Precipitation Days[13]	19	6	7	
Rainfall Days[13]	19	6	1	
Snowfall Days[13]	0	0	7	
Total Evaporation[14] (mm)	190.8	276.0	208.7	
Mean Wind Speed[15] (km/hr)	29.6	14.8*	19.4	
Peak Gust Speed[16] (km/hr)	87	63	132	
Total Bright Sunshine[17] (hr)	272.7	263**	292	
Percent Possible Bright Sunshine[18]	56	54	60	
Total Global Radiation[19] (MJ m^{-2})	636.2	603	659	
Total Diffuse Radiation[19] (MJ m^{-2})	201.0	228	--	
Mean Soil Temperature[22] (°C) (10, 50 cm)	10.7, 10.1	14.5, 11.2	12.3, 8.8	
Mean Soil Temperature[22] (°C) (150, 300 cm)	5.3, 3.5	5.6, 3.9	4.1, 2.9	

*6 days missing data
**includes automated data (May 1-25)

SUMMARY MAY 1989 - Revised Version

May 1989 started out looking like a repeat of last May. Up until the 11th there had only been 1.5 mm of precipitation, a dust storm on the 10th and fairly high daily temperatures. On the 11th it started to rain, and rain it did, so that by the 25th of May the Climate Reference Station had received 85.9 mm of precipitation. By May 31st the total recorded precipitation was 88.4 mm, 223% of normal. The mean monthly temperature was near normal at 11.5°C. The mean maximum temperature equalled the normal value of 18.1°C, while the mean minimum temperature was 4.8°C. There were fewer heating and growing degree days than normal by 18 and 10.5 respectively. The evaporation (190.8 mm) was below normal and well below last year's value of 276.0 mm. There was a high mean wind speed in May with a value of 29.6 km/hr and a maximum of 87 km/hr on the 10th; the same day that there was reduced visibility due to blowing dust. The amount of bright sunshine was less than normal by 19 hours. The soil temperatures were all below last year's values but when they are compared, the mean values of the 10 cm depth was 1.6° cooler than normal, the 50 cm was 1.3° warmer, the 150 cm depth was 1.2° warmer and the 300 cm depth was 0.6°C warmer.

May 1989 brought the precipitation amount up to be 69% normal for the year. As the saying "it never rains but it pours" was certainly applicable this month.

SASKATCHEWAN RESEARCH COUNCIL
CLIMATE REFERENCE STATION
LOCATION: 52°09'N 106°36'W 497 m MSL
MONTHLY WEATHER SUMMARY FOR
JUNE, 1989

Element	1989 Value	1988 Value	Mean or Extreme Value 1951-1980[2]	Extreme All Years[3]
Monthly Mean Temperature[4] (°C)	16.9	21.3	15.6	
Monthly Mean Maximum Temperature[5] (°C)	23.5	28.8	22.1	
Monthly Mean Minimum Temperature[6] (°C)	10.3	13.8	9.1	
Extreme Maximum Temperature[7] (°C)	34.0	41.0	35.6	41.0
Year/Day(s)[20]	1989/30th	1988/5th	1976/4	1988/5th
Years of Record[21]	1	1	17	93
Extreme Minimum Temperature[7] (°C)	3.5	4.0	-3.3	-3.9
Year/Day(s)[20]	1989/13th	1988/15	1967/6	1903/9 & 1917/2
Years of Record[21]	1	1	17	93
Days with Frost[8]	0	0	0	
Heating Degree-Days[9] (18°C base)	63.5	15.0	89.0	
Growing Degree-Days[10] (5°C base)	351.5	495.0	319.0	
Total Precipitation[11] (mm)	63.5	23.7	59.9	
Total Rainfall[11] (mm)	63.5	23.7	59.9	
Total Snowfall[12] (cm)	0	0	0	
Greatest 24-hour Precipitation (mm)	30.0	11.0	45.0	99.4
Year/Day(s)[20]	1989/25	1988/29	1970/10	1983/24
Years of Record[21]	1	1	17	93
Greatest 24-hour Rainfall (mm)	30.0	11.0	45.0	99.4
Year/Day(s)[20]	1989/25	1988/29	1970/10	1983/24
Years of Record[21]	1	1	17	93
Greatest 24-hour Snowfall (cm)	0	-	0	1.8
Year/Day(s)[20]	-	-	-	1938/29
Years of Record[21]	-	-	17	93
Precipitation Days[13]	7	10	11	
Rainfall Days[13]	7	10	11	
Snowfall Days[13]	0	0	0	
Total Evaporation[14] (mm)	214.2[a]	352.1	218.3	
Mean Wind Speed[15] (km/hr)	27.9	16.5[b]	18.2	
Peak Gust Speed[16] (km/hr)	89	68	101	
Total Bright Sunshine[17] (hr)	262.6	323.1	294.0	
Percent Possible Bright Sunshine[18]	53	65	59	
Total Global Radiation[19] (MJ m^{-2})	690.4	685	683	
Total Diffuse Radiation[19] (MJ m^{-2})	234.1	167	-	
Mean Soil Temperature[22] (°C) (10, 50 cm)	15.4, 14.3	21.0, 17.2	17.5, 14.0	
Mean Soil Temperature[22] (°C) (150, 300 cm)	8.4, 5.4	9.5, 6.0	8.3, 5.2	

[b] 6 days missing data
[a] 1 day missing data

SUMMARY:

June 1989 was what could be termed as typical. The mean maximum, mean minimum and mean temperatures were all about one degree above the normal recorded values. The highest the temperature reached this month was only 34°C (rather low compared to last year's record of 41°C) and the lowest temperature recorded was 3.5°C. The overnight lows were never very low because of the large amount of cloud cover. The number of heating degree days was 25.5 less than normal but much higher than the 15.0 that was recorded last year. The number of growing degree days was 32.5 greater than the mean, but 143.5 less than last years high value. The amount of precipitation received was greater than normal for the second month in a row. This year to date has received 204.4 mm of precipitation as compared to the normal value of 187.7 mm. The greatest one day rainfall occurred on Sunday the 25th when 30.0 mm fell. The amount of evaporation was about the same as normal but well below last year's value by over 140 mm. June was once again fairly windy with a mean wind speed of 27.9 km/h and a maximum gust recorded at 89 km/hr on the last day of the month. The amount of bright sunshine was 32 hours below the mean value and 60.5 hours below last year's sunny hot month. The soil temperatures were all above the mean value except for the 10 cm depth which was 2.1°C below.

June 1989, with its large amount of rainfall, was not a good month for keeping the car clean, but it did make the crops (and weeds) in the Saskatoon area grow very well.

V. Wittrock

SASKATCHEWAN RESEARCH COUNCIL

CLIMATE REFERENCE STATION

LOCATION: 52°09'N 106°36'W 497 m MSL

MONTHLY WEATHER SUMMARY FOR

JULY, 1989

Element	1989 Value	1988 Value	Mean or Extreme Value 1951-1980[2]	Extreme All Years[3]
Monthly Mean Temperature[4] (°C)	20.0	19.2	18.4	
Monthly Mean Maximum Temperature[5] (°C)	27.3	26.6	25.2	
Monthly Mean Minimum Temperature[6] (°C)	12.8	11.7	11.6	
Extreme Maximum Temperature[7] (°C)	37.0	37.0	36.7	40.0
Year/Day(s)[20]	1989/21st	1988/22nd	1964/12	1919/17;1941/19
Years of Record[21]	1	1	17	93
Extreme Minimum Temperature[7] (°C)	8.0	16.0	1.7	-0.6
Year/Day(s)[20]	1989/13th	1988/9th	1967/2	1918/25
Years of Record[21]	1	1	17	93
Days with Frost[8]	0	0	0	0
Heating Degree-Days[9] (18°C base)	12.0	16.5	32.8	
Growing Degree-Days[10] (5°C base)	463.5	451.5	416.3	
Total Precipitation[11] (mm)	27.8	47	56.2	
Total Rainfall[11] (mm)	27.8	47	56.2	
Total Snowfall[12] (cm)	0.0	0.0	0.0	
Greatest 24-hour Precipitation (mm)	11.5	25.1	45.5	79.2
Year/Day(s)[20]	1989/10th	1988/6th	1968/29	1946/3
Years of Record[21]	1	1	17	93
Greatest 24-hour Rainfall (mm)	11.5	25.1	45.5	79.2
Year/Day(s)[20]	1989/10th	1988/6th	1968/29	1946/3
Years of Record[21]	1	1	17	93
Greatest 24-hour Snowfall (cm)	0.0	0.0	0.0	0.0
Year/Day(s)[20]	--	--	--	--
Years of Record[21]	1	1	17	--
Precipitation Days[13]	5	7	11	
Rainfall Days[13]	5	7	11	
Snowfall Days[13]	0	0	0	
Total Evaporation[14] (mm)	261.6	290.7	230.1	
Mean Wind Speed[15] (km/hr)	24.3	14.8	16.7	
Peak Gust Speed[16] (km/hr)	79	M	105	
Total Bright Sunshine[17] (hr)	328.8	336.5	341.0	
Percent Possible Bright Sunshine[18]	65.6	67.1	68	
Total Global Radiation[19] (MJ m^{-2})	628.2[a]	661.1	737	
Total Diffuse Radiation[19] (MJ m^{-2})	201.2[a]	195.1	--	
Mean Soil Temperature[22] (°C) (10, 50 cm)	19.4, 18.0	18.2, 17.9	19.7, 16.9	
Mean Soil Temperature[22] (°C) (150, 300 cm)	11.3, 7.4	11.5, 8.6	11.4, 7.6	

[a] 4 days missing data M data missing

SUMMARY:

July 1989 was a hot dry month. This was the first month since April 1989 that below normal precipitation was recorded. The Climate Reference Station recorded 27.8 mm of precipitation, below half of the normal value of 56.2 mm. The January to July total precipitation was only 11.7 mm below normal. Above normal temperatures were recorded this month. The mean monthly temperature of 20.0°C was 1.6°C above the normal value. The mean maximum temperature was 2.1°C above the normal and the mean monthly minimum was 1.2°C above. The extreme maximum, recorded on the 21st, equalled last years temperatures of 37°C, while the mean minimum was quite cool at 8.0°C recorded on the 13th. The high temperatures allowed for a significant number of growing degree days (463.5), well above the normal of 416.3. In contrast, the number of heating degree days were lower than normal by 20.8 days. The total evaporation of 261.6 mm was approximately 30 mm more than the normal but was 29.1 mm less than last year's evaporation rate. July 1989 was also very windy. The mean wind speed was 24.2 km/hr, with a peak gust of 79 km/hr occurring on the 30th of the month. July had only 65.6% of the total possible sunshine. The 10 and 50 cm soil temperatures were above the value recorded last year but the temperatures at the 150 and 300 cm depths were below by 0.2°C and 1.2°C respectively.

The hot dry weather of July 1989, reminded everyone of the kind of weather we had last year.

Virginia Wittrock
Research Technologist

SASKATCHEWAN RESEARCH COUNCIL

CLIMATE REFERENCE STATION

LOCATION: 52°09'N 106°36'W 497 m MSL

MONTHLY WEATHER SUMMARY FOR

AUGUST 1989

Element	1989 Value	1988 Value	Mean or Extreme Value 1951-1980[2]	Extreme All Years[3]
Monthly Mean Temperature[4] (°C)	18.5	16.8	17.2	
Monthly Mean Maximum Temperature[5] (°C)	25.1	22.4	24.2	
Monthly Mean Minimum Temperature[6] (°C)	11.8	11.1	10.2	
Extreme Maximum Temperature[7] (°C)	35.0	31.0	36.7	37.8
Year/Day(s)[20]	1989/1st	1988/13th	1970/7	1893/6, 1949/6
Years of Record[21]	1	1	17	92
Extreme Minimum Temperature[7] (°C)	6.0	3.0	-2.8	-2.8
Year/Day(s)[20]	1989/20th	1988/28th	1976/28	1976/28
Years of Record[21]	1	1	17	92
Days with Frost[8]	0	0	0	
Heating Degree-Days[9] (18°C base)	45.5	49.5	60.1	
Growing Degree-Days[10] (5°C base)	412.0	371.5	378.7	
Total Precipitation[11] (mm)	58.6	78.2	35.1	
Total Rainfall[11] (mm)	58.6	78.2	35.1	
Total Snowfall[12] (cm)	0.0	0.0	0.0	
Greatest 24-hour Precipitation (mm)	27.9	20.4	24.6	73.7
Year/Day(s)[20]	1989/25th	1988/1st	1968/18	1945/3
Years of Record[21]	1	1	17	92
Greatest 24-hour Rainfall (mm)	27.9	20.4	24.6	73.7
Year/Day(s)[20]	1989/25th	1988/1st	1968/18	1945/3
Years of Record[21]	1	1	17	92
Greatest 24-hour Snowfall (cm)	0.0	0.0	0.0	0.0
Year/Day(s)[20]	-	-	-	-
Years of Record[21]	1	1	17	
Precipitation Days[13]	9	11	10	
Rainfall Days[13]	9	11	10	
Snowfall Days[13]	0	0	0	
Total Evaporation[14] (mm)	218.0	195.4	201.4	
Mean Wind Speed[15] (km/hr)	24.1	M	16.5	
Peak Gust Speed[16] (km/hr)	70	72	151	
Total Bright Sunshine[17] (hr)	252.9	238.1	293.0	
Percent Possible Bright Sunshine[18]	56	53	65	
Total Global Radiation[19] (MJ m^{-2})	583.1	516.2	605.0	
Total Diffuse Radiation[19] (MJ m^{-2})	240.0	143.9	-	
Mean Soil Temperature[22] (°C) (10, 50 cm)	17.6, 18.0	17.7, 16.6	18.4, 16.7	
Mean Soil Temperature[22] (°C) (150, 300 cm)	12.8, 9.2	12.1, 11.9	12.6, 9.3	

M data missing

SUMMARY:

August 1989 had above normal temperatures and above normal precipitation. The monthly mean temperature was 1.3°C above normal while the monthly mean maximum and the monthly mean minimum were 0.9°C and 1.6°C above normal. The high temperatures led to a low heating degree day value of 45.5 and a high growing degree day value of 412.0. The amount of precipitation that fell was 58.6 mm, 23.5 mm above normal. So far this year, to the end of August, Saskatoon has received 290.8 mm of precipitation compared to last year's 225.1 mm. The normal amount of precipitation to the end of August is 279.0 mm. The total amount of evaporation at 218.0 mm was greater than normal. The mean wind speed of 24.1 km/h was also fairly high. The peak gust was only 70 km/h, which is well below the maximum ever recorded of 151 km/h. The amount of total bright sunshine was 252.9 h, above last year's amount, but below the long term average. Total global radiation was 583.2 MJ m-2, while the total diffuse radiation was 240.0 MJ m-2. The 10 cm and the 300 cm mean soil temperatures were both below normal and below last year's values. The 50 cm and 150 cm mean soil temperature were above the normal and last year's temperatures.

August 1989 will be remembered by farmers as a month that was not very conducive to combining. It rained 11 days, in varying amounts, out of the last 16 days of the month.

Virginia Wittrock

Virginia Wittrock, Research Technologist

SASKATCHEWAN RESEARCH COUNCIL

CLIMATE REFERENCE STATION

LOCATION: 52°09'N 106°36'W 497 m MSL

MONTHLY WEATHER SUMMARY FOR

SEPTEMBER 1989

Element	1989 Value	1988 Value	Mean or Extreme Value 1951-1980[2]	Extreme All Years[3]
Monthly Mean Temperature[4] (°C)	12.2	11.8	11.5	
Monthly Mean Maximum Temperature[5] (°C)	18.5	18.5	17.8	
Monthly Mean Minimum Temperature[6] (°C)	5.8	5.1	5.1	
Extreme Maximum Temperature[7] (°C)	27.0	35.0	35.6	35.6
Year/Day(s)[20]	1989/16	1988/6	1978/4	1978/4
Years of Record[21]	1	1	16	90
Extreme Minimum Temperature[7] (°C)	-3.0	-2.5	-7.8	-11.1
Year/Day(s)[20]	1989/22	1988/25	1978/30	1908/28
Years of Record[21]	1	1	16	90
Days with Frost[8]	4	4	4	
Heating Degree-Days[9] (18°C base)	179.5	192.5	201.3	
Growing Degree-Days[10] (5°C base)	213.5	209.0	200.8	
Total Precipitation[11] (mm)	26.4	22.3	32.2	
Total Rainfall[11] (mm)	26.0	22.3	30.8	
Total Snowfall[12] (cm)	0.0	0.0	1.3	
Greatest 24-hour Precipitation (mm)	14.2	12.0	29.6	44.2
Year/Day(s)[20]	1989/2	1988/25	1980/3	1931/12
Years of Record[21]	1	1	16	90
Greatest 24-hour Rainfall (mm)	14.2	12.0	29.6	44.2
Year/Day(s)[20]	1989/2	1988/25	1980/3	1931/12
Years of Record[21]	1	1	16	90
Greatest 24-hour Snowfall (cm)	0.0	0.0	5.6	17.6
Year/Day(s)[20]	--	--	1973/14	1982/28
Years of Record[21]	1	1	16	90
Precipitation Days[13]	6	8	9	
Rainfall Days[13]	6	8	9	
Snowfall Days[13]	0	0	1	
Total Evaporation[14] (mm)	121.4	154.1	124.1	
Mean Wind Speed[15] (km/hr)	26.5	15.2	18.1	
Peak Gust Speed[16] (km/hr)	70	77.0	148.0	
Total Bright Sunshine[17] (hr)	200.6[a]	186.7	191.0	
Percent Possible Bright Sunshine[18]	53	49	50	
Total Global Radiation[19] (MJ m^{-2})	433.2[b]	427.6[b]	409.3	
Total Diffuse Radiation[19] (MJ m^{-2})	131.5[b]	111.1[b]	--	
Mean Soil Temperature[22] (°C) (10, 50 cm)	11.0, 13.5[a]	11.4, 13.7	12.3, 13.2	
Mean Soil Temperature[22] (°C) (150, 300 cm)	11.8, 10.0[a]	11.6, 11.1	12.1, 10.1	

b Total diffuse radiation and total global radiation are low due to incomplete data.
a Including 2 day estimations from data logger.

SUMMARY:

September continued the way August ended, wet but warm. The rain fell intermittently until the middle of the month and farmers could then get back onto the fields and finish the harvest. The total amount of precipitation that was received in September was 26.4 mm, only 5.8 mm below the normal amount. The most rain fell on the 2nd when 14.2 mm was recorded. The mean monthly temperature of 12.2°C was 0.7°C above normal and 0.4°C above last year's figure. The extreme maximum temperature (27.0°C) was well below the record (35.6°C) as well as last year's extreme of 35.0°C. The extreme minimum temperature recorded was -3.0°C. The first fall frost did not occur until the 10th. Fall frost has a 50% chance of occurrence about this time of year for this area. The amount of evaporation that was recorded (121.4 mm) was near the normal value of 124.1 mm. September had a high mean wind speed of 26.5 km/hr. The peak gust that was obtained was 70 km/hr. The amount of total bright sunshine that was recorded was 200.6 hours, only 9.6 hours less than what is normal ly recorded. The 10 and 50 cm soil depths were below last year's temperatures. The 150 cm soil depth was 0.2°C above last year's temperature and the 300 cm soil depth was over 1°C cooler than last year's recorded value.

September, 1989 continued the August trend of being warmer than normal but also moderately wet. The rain, however, came at a bad time for most farmers in the Saskatoon area as much of the crop was left in the field until the middle of the month.

Virginia Wittrock

Virginia Wittrock, Research Technologist

SASKATCHEWAN RESEARCH COUNCIL
CLIMATE REFERENCE STATION
LOCATION: 52°09'N 106°36'W 497 m MSL
MONTHLY WEATHER SUMMARY FOR
OCTOBER, 1989

Element	1989 Value	1988 Value	Mean or Extreme Value 1951-1980[2]	Extreme All Years[3]
Monthly Mean Temperature[4] (°C)	5.4	5.4	5.2	
Monthly Mean Maximum Temperature[5] (°C)	11.6	12.4	11.1	
Monthly Mean Minimum Temperature[6] (°C)	-0.9	-1.7	-0.8	
Extreme Maximum Temperature[7] (°C)	20.0	25	28.3	32.2
Year/Day(s)[20]	1989/8 & 23	1988/8	1964/13	1943/5
Years of Record[21]	1	1	17	90
Extreme Minimum Temperature[7] (°C)	-7.0	-14.5	-18.3	-25.6
Year/Day(s)[20]	1989/29	1988/29	1972/18	1919/26
Years of Record[21]	1	1	17	90
Days with Frost[8]	20	20	18	
Heating Degree-Days[9] (18°C base)	394.5	391.5	393.0	
Growing Degree-Days[10] (5°C base)	63.5	88.0	71.1	
Total Precipitation[11] (mm)	15.4	7.9	17.5	
Total Rainfall[11] (mm)	2.2	7.4	7.7	
Total Snowfall[12] (cm)	13.2	0.5	10.3	
Greatest 24-hour Precipitation (mm)	7.2	4.2	25.4	36.7
Year/Day(s)[20]	1989/14	1988/16	1969/2	1984/16
Years of Record[21]	1	1	17	90
Greatest 24-hour Rainfall (mm)	1.8	4.2	23.1	34.0
Year/Day(s)[20]	1989/13	1988/16	1969/2	1914/5
Years of Record[21]	1	1	17	90
Greatest 24-hour Snowfall (cm)	7.2	0.5	22.9	36.7
Year/Day(s)[20]	1989/14	1988/26	1969/3	1984/16
Years of Record[21]	1	1	17	90
Precipitation Days[13]	7	5	5	
Rainfall Days[13]	3	4	3	
Snowfall Days[13]	4	2	3	
Total Evaporation[14] (mm)	35.4a	78.3a	--	
Mean Wind Speed[15] (km/hr)	26.7b	25.1c	18.0	
Peak Gust Speed[16] (km/hr)	76	60	138	
Total Bright Sunshine[17] (hr)	167.2	208.1	175.0	
Percent Possible Bright Sunshine[18]	51	63	53	
Total Global Radiation[19] (MJ m^{-2})	326.5	353.9	255.6	
Total Diffuse Radiation[19] (MJ m^{-2})	92.4	74.8	--	
Mean Soil Temperature[22] (°C) (10, 50 cm)	4.9, 9.0	4.7, 8.9	5.4, 8.0	
Mean Soil Temperature[22] (°C) (150, 300 cm)	9.9, 9.3	10.0, 11.1	9.8, 9.5	

a. Evaporation program was discontinued after October 24, 1988 and October 12, 1989
b. Calculated with 29 days of data
c. Calculated with 23 days of data

SUMMARY:

October 1989 was a yoyo month for temperatures and precipitation. The month started off cool and wet, then it warmed up for Thanksgiving weekened when a high of 20°C was obtained. The middle of the month was cool and wet again when the first measurable amount of snowfall fell. It snowed 7.8 cm over a two day period. Then the warm "Indian Summer" returned once more, with the day time high reaching 20°C on the 24th of the month. It turned cold (-7°C on the 29th) and snowed again (5.4 cm) at the end of the month, just in time for Halloween. The total amount of precipitation received was only 2.3 mm below the amount that is normally received. To the end of October the Saskatoon area is 1.2% above normal for precipitation. October was also a windy month. The mean wind speed was 26.7 km/hr, well above the normal of 18.0 km/hr. The peak wind speed of 76 km/hr was recorded on the 8th. This is above last year's peak of 60 km/hr but well below the extreme value of 138 km/hr. There was 167.2 hours of sunshine recorded - only 51% of normal. The 10 cm mean soil temperature was 0.2°C warmer than last year, while the 50 cm mean soil temperature was 0.1°C warmer. The 150 and 300 cm soil temperatures were both cooler than last year's values by 0.1°C and 1.8°C respectively.

This October had its' share of snowfall, but do you remember 1984 when it snowed 36.7 cm in one day?

Virginia Wittrock
Virginia Wittrock
Research Technologist

SASKATCHEWAN RESEARCH COUNCIL
CLIMATE REFERENCE STATION
LOCATION: 52°09'N 106°36'W 497 m MSL
MONTHLY WEATHER SUMMARY FOR

NOVEMBER, 1989

Element	1989 Value	1988 Value	Mean or Extreme Value 1951-1980[2]	Extreme All Years[3]
Monthly Mean Temperature[4] (°C)	-5.6	-3.9	-5.5	
Monthly Mean Maximum Temperature[5] (°C)	-0.8	-0.1	-1.0	
Monthly Mean Minimum Temperature[6] (°C)	-10.3	-7.6	-10.0	
Extreme Maximum Temperature[7] (°C)	9.5	12.0	19.4	21.7
Year/Day(s)[20]	1989/19	1988/5	1975/4	1903/3
Years of Record[21]	1	1	18	91
Extreme Minimum Temperature[7] (°C)	-23.0	-19.5	-32.8	-39.4
Year/Day(s)[20]	1989/16	1988/17 & 27	1970/27	1893/30
Years of Record[21]	1	1	18	91
Days with Frost[8]	29	28	29	
Heating Degree-Days[9] (18°C base)	703.0	656.5	704.4	
Growing Degree-Days[10] (5°C base)	0.0	2.5	2.6	
Total Precipitation[11] (mm)	22.7	7.9	16.0	
Total Rainfall[11] (mm)	5.0	0.8	2.5	
Total Snowfall[12] (cm)	17.7	7.1	12.3	
Greatest 24-hour Precipitation (mm)	5.8	3.6	19.3	27.9
Year/Day(s)[20]	1989/2	1988/12	1978/4	1930/1
Years of Record[21]	1	1	18	91
Greatest 24-hour Rainfall (mm)	5.0	0.8	14.5	14.5
Year/Day(s)[20]	1989/3	1988/6	1978/4	1978/4
Years of Record[21]	1	1	18	91
Greatest 24-hour Snowfall (cm)	5.8	3.6	13.2	27.9
Year/Day(s)[20]	1989/2	1988/12	1966/16	1938/1
Years of Record[21]	1	1	18	91
Precipitation Days[13]	13	7	9	
Rainfall Days[13]	1	1	1	
Snowfall Days[13]	12	6	8	
Total Evaporation[14] (mm)	--	--	--	
Mean Wind Speed[15] (km/hr)	15.8	23.8[a]	16.9	
Peak Gust Speed[16] (km/hr)	83.0	75.0	100.0	
Total Bright Sunshine[17] (hr)	84.1	33.8	109.0	
Percent Possible Bright Sunshine[18]	32	32	41	
Total Global Radiation[19] (MJ m^{-2})	195.2	190.6	129.3	
Total Diffuse Radiation[19] (MJ m^{-2})	73.2	59.7	--	
Mean Soil Temperature[22] (°C) (10, 50 cm)	-0.8, 3.9	-1.2, 3.8	-1.7, 2.5	
Mean Soil Temperature[22] (°C) (150, 300 cm)	7.3, 8.2	7.4, 8.3	6.9, 8.1	

[a] 3 days of missing data

SUMMARY:

November's mean temperature was very near normal and almost 2°C lower than 1988. The monthly mean maximum and mean minimum temperatures differed only slightly from the 30 year normals. These near normal conditions are further reflected by the number of heating degree days. Monthly precipitation of 22.7 mm was 6.7 mm above the normal. Precipitation was recorded on 13 days- nearly half of the month. The Jan. to Nov. total precipitation of 357.0 mm remains slightly above the normal of 344.7 mm. The depth of snow on the ground at CRS was zero until the 12th when it reached 5 cm; then it decreased to 2 cm at the end of the month. Wind conditions have been slightly below normal. Eighty-four bright sunshine hours were recorded (25 hours less than normal). Soil temperatures remain above normal at all levels (by 0.1 to 2.2°C).

November/89 has been a moderately mild and wet month. The temperatures, however, are a drastic contrast to the mid twenty degree Celsius temperatures experienced in the lower latitudes, for example, by a very fortunate few on the island of St. Kitt's.

Virginia Wittrock, Research Technologist

SASKATCHEWAN RESEARCH COUNCIL

CLIMATE REFERENCE STATION

LOCATION: 52°09'N 106°36'W 497 m MSL

MONTHLY WEATHER SUMMARY FOR

DECEMBER 1989

Element	1989 Value	1988 Value	Mean or Extreme Value 1951-1980[2]	Extreme All Years[3]
Monthly Mean Temperature[4] (°C)	-15.4	-11.0	-13.9	
Monthly Mean Maximum Temperature[5] (°C)	-10.0	-6.2	-9.3	
Monthly Mean Minimum Temperature[6] (°C)	-20.8	-15.7	-18.5	
Extreme Maximum Temperature[7] (°C)	4.5	7.0	8.0	13.3
Year/Day(s)[20]	1989/23, 24, 26	1988/2	1980/27	1939/5
Years of Record[21]	1	1	18	91
Extreme Minimum Temperature[7] (°C)	-40.0	-34.5	-42.2	-43.9
Year/Day(s)[20]	1989/20	1988/25 & 28	1973/31	1892/22
Years of Record[21]	1	1	18	91
Days with Frost[8]	31	31	31	
Heating Degree-Days[9] (18°C base)	1,013.5	894.0	992.0	
Growing Degree-Days[10] (5°C base)	0.0	0.0	0.0	
Total Precipitation[11] (mm)	29.0	18.2	25.8	
Total Rainfall[11] (mm)	11.4	0.0	0.8	
Total Snowfall[12] (cm)	17.6	18.2	23.1	
Greatest 24-hour Precipitation (mm)	8.0	8.8	14.5	20.6
Year/Day(s)[20]	1988/3	1988/22	1973/23	1936/24
Years of Record[21]	1	1	18	90
Greatest 24-hour Rainfall (mm)	8.0	0.0	4.3	4.8
Year/Day(s)[20]	1988/3	--	1979/6	1956/26
Years of Record[21]	1	--	18	91
Greatest 24-hour Snowfall (cm)	6.8	8.8	14.5	20.6
Year/Day(s)[20]	1988/8	1988/22	1973/23	1936/24
Years of Record[21]	1	1	18	90
Precipitation Days[13]	7	6	13	
Rainfall Days[13]	2	0	1	
Snowfall Days[13]	6	6	12	
Total Evaporation[14] (mm)	—	--	--	
Mean Wind Speed[15] (km/hr)	15	22.8[a]	16.8	
Peak Gust Speed[16] (km/hr)	68	71	97	
Total Bright Sunshine[17] (hr)	72.4	31.4	86.0	
Percent Possible Bright Sunshine[18]	30	34	36	
Total Global Radiation[19] (MJ m^{-2})	170.0	163.8[b]	96.0	
Total Diffuse Radiation[19] (MJ m^{-2})	61.1	49.6[b]	--	
Mean Soil Temperature[22] (°C) (10, 50 cm)	-6, -1.0	-6.3, -0.7	-6.6, -1.8	
Mean Soil Temperature[22] (°C) (150, 300 cm)	4.4, 6.5	4.5, 6.7	3.9, 6.2	

[a] 7 days missing data [b] 1 day missing data

SUMMARY:

December, 1989 can be remembered for its rain, frigidly cold weather and Christmas thaw. The month started out mild with above normal temperatures and with 8.0 mm of rain on the third. This made driving and walking conditions very challenging. On the 8th, the temperature started to drop and snow began to fall. By the 15th, 14.4 cm of snow had fallen and the minimum temperature was down to -27°C. On the 20th the minimum temperature recorded was -40°C and the maximum temperature was only -36°C. The record low for December was set in 1892 with a temperature of -43.9°C. The temperature rebounded by the 23rd and was back up to 4.5°C just in time for the Christmas season - a range of 44.5°C. Saskatoon then received more rain (3.4 mm) on the 25th. For December Saskatoon received 3.2 mm more precipitation than normal. The mean wind speed was 1.8 km/hr below normal and the peak gust of 68 km/hr was well below the extreme peak of 97 km/hr. There was below normal bright sunshine with only 72.4 hours as compared to the normal of 86.0. The soil temperatures are lower than last year because of the colder air temperatures.

This December contained what seemed to be a combination of climate types. With the rain that was received, it felt like Vancouver weather but then with the -40°C temperatures one could almost think that they were living in Aklavik.

Virginia Wittrock

Virginia Wittrock, Research Technologist

Table 14. Soil Temperature and Snow Cover at Saskatoon SRC, January, 1989*

Depth (cm)	Mean Temp. (°C)	Range (°C)	Frost Days	Date	Snow Depth (cm)
5	-8.6	12.0	31	1	8
10	-8.1	10.5	31	5	8
20	-6.5	8.5	31	10	7
50	-3.3	3.0	31	15	6
100	-0.1	1.5	19	20	7
150	2.1	1.5	0	25	7
300	4.8	2.0	0	31	14

*at 0900 h

Table 15. Soil Temperature and Snow Cover at Saskatoon SRC, February, 1989.*

Depth (cm)	Mean Temp. (°C)	Range (°C)	Frost Days	Date	Snow Depth (cm)
5	-7.4	3.5	28	1	20
10	-7.2	3.0	28	5	20
20	-5.8	3.0	28	10	19
50	-3.1	2.0	28	15	18
100	-0.5	1.0	28	20	17
150	1.2	0.5	0	25	18
300	3.6	1.0	0	28	20

*at 0900 h

Table 16. Soil Temperature and Snow Cover at Saskatoon SRC, March, 1989.*

Depth (cm)	Mean Temp. (°C)	Range (°C)	Frost Days	Date	Snow Depth (cm)
5	-6.0	7.0	31	1	20
10	-5.9	7.0	31	5	19
20	-4.7	6.0	31	10	14
50	-2.8	2.0	31	15	17
100	-1.0	1.5	31	20	16
150	0.6	1.5	1	25	15
300	2.7	0.5	0	31	9

*at 0900 h

Table 17. Soil Temperature and Snow Cover at Saskatoon SRC, April, 1989.*

Depth (cm)	Mean Temp. (°C)	Range (°C)	Frost Days	Date	Snow Depth (cm)
5	3.1	11.0	1	1	5
10	3.5	10.0	0	5	0
20	4.8	11.0	1	10	0
50	3.4	8.0	2	15	0
100	1.6	4.5	4	20	0
150	1.5	4.0	2	25	0
300	2.4	0.5	0	30	0

*at 0900 h

Table 18. Soil Temperature and Snow Cover at Saskatoon SRC, May, 1989.*

Depth (cm)	Mean Temp. (°C)	Range (°C)	Frost Days	Date	Snow Depth (cm)
5	10.4	11.5	0	1	0
10	10.7	7.5	0	5	0
20	12.0	5.5	0	10	0
50	10.1	4.0	0	15	0
100	6.8	3.5	0	20	0
150	5.3	3.0	0	25	0
300	3.5	2.0	0	31	0

*at 0900 h

Table 19. Soil Temperature and Snow Cover at Saskatoon SRC, June, 1989.*

Depth (cm)	Mean Temp. (°C)	Range (°C)	Frost Days	Date	Snow Depth (cm)
5	15.2	6.5	0	1	0
10	15.4	6.0	0	5	0
20	16.8	5.5	0	10	0
50	14.3	4.0	0	15	0
100	10.4	3.5	0	20	0
150	8.4	3.0	0	25	0
300	5.4	2.0	0	30	0

*at 0900 h

Table 20. Soil Temperature and Snow Cover at Saskatoon SRC, July, 1989.*

Depth (cm)	Mean Temp. (°C)	Range (°C)	Frost Days	Date	Snow Depth (cm)
5	19.4	7.5	0	1	0
10	19.4	6.5	0	5	0
20	21.2	6.0	0	10	0
50	18.0	2.5	0	15	0
100	13.6	3.0	0	20	0
150	11.3	3.0	0	25	0
300	7.4	3.0	0	31	0

*at 0900 h

Table 21. Soil Temperature and Snow Cover at Saskatoon SRC, August, 1989.*

Depth (cm)	Mean Temp. (°C)	Range (°C)	Frost Days	Date	Snow Depth (cm)
5	17.4	10.5	0	1	0
10	17.6	10.0	0	5	0
20	19.7	9.0	0	10	0
50	18.0	4.0	0	15	0
100	14.4	1.5	0	20	0
150	12.8	0.5	0	25	0
300	9.2	1.5	0	31	0

*at 0900 h

Table 22. Soil Temperature and Snow Cover at Saskatoon SRC, September, 1989.*

Depth (cm)	Mean Temp. (°C)	Range (°C)	Frost Days	Date	Snow Depth (cm)
5	10.8	7.5	0	1	0
10	11.0	7.5	0	5	0
20	13.2	6.0	0	10	0
50	13.5	3.5	0	15	0
100	12.2	2.5	0	20	0
150	11.8	1.5	0	25	0
300	10.0	1.0	0	30	0

*at 0900 h

Table 23. Soil Temperature and Snow Cover at Saskatoon SRC, October, 1989.*

Depth (cm)	Mean Temp. (°C)	Range (°C)	Frost Days	Date	Snow Depth (cm)
5	4.8	8.5	0	1	0
10	4.9	8.0	0	5	0
20	7.5	8.5	0	10	0
50	9.0	6.0	0	15	0
100	9.3	3.0	0	20	0
150	9.9	2.0	0	25	0
300	9.3	0.5	0	31	0

*at 0900 h

Table 24. Soil Temperature and Snow Cover at Saskatoon SRC, November, 1989.*

Depth (cm)	Mean Temp. (°C)	Range (°C)	Frost Days	Date	Snow Depth (cm)
5	-0.8	5.0	16	1	0
10	-0.5	4.5	11	5	0
20	1.3	5.0	7	10	0
50	3.9	4.5	0	15	5
100	5.9	3.5	0	20	0
150	7.3	3.0	0	25	4
300	8.2	1.5	0	30	2

*at 0900 h

Table 25. Soil Temperature and Snow Cover at Saskatoon SRC, December, 1989.*

Depth (cm)	Mean Temp. (°C)	Range (°C)	Frost Days	Date	Snow Depth (cm)
5	-6.9	17.0	30	1	3
10	-6.5	16.0	30	5	1
20	-4.9	11.5	30	10	5
50	-1.0	6.0	19	15	7
100	2.2	4.0	0	20	6
150	4.4	3.0	0	25	9
300	6.5	2.0	0	31	7

*at 0900 h

Table 26. Diffuse Solar Radiation (MJ m^{-2}) at Saskatoon SRC, 1989*.

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.8	2.2	4.0	2.6	3.9	9.7	M	10.3	6.7	4.9	4.2	1.9
2	2.1	3.8	3.4	6.4	7.1	9.3	M	6.1	5.9	3.7	3.1	1.8
3	2.5	3.9	3.0	5.2	7.3	4.0	M	7.9	7.3	2.3	2.1	1.3
4	2.4	3.6	3.2	3.4	7.1	9.2	M	10.1	4.0	2.5	1.7	1.9
5	1.6	4.5	4.3	5.8	3.7	8.5	9.8	9.1	7.8	2.1	3.0	1.5
6	2.9	5.0	4.4	7.1	7.3	5.8	8.0	8.0	6.7	1.9	2.3	2.0
7	3.1	1.9	4.7	8.0	6.3	12.0	8.4	10.1	M	6.1	2.5	1.5
8	1.7	3.7	6.7	5.3	6.4	9.3	6.3	6.7	M	3.5	2.9	1.2
9	1.9	2.6	7.8	3.8	6.6	10.8	6.7	6.6	6.0	2.4	2.4	2.0
10	1.3	1.9	3.9	9.5	7.5	8.6	7.5	7.5	8.3	3.7	2.2	1.7
11	1.6	2.1	7.0	3.4	5.5	8.9	7.3	4.1	7.7	3.4	1.3	2.1
12	2.4	4.8	4.8	6.8	6.4	9.4	11.4	6.5	4.0	2.0	2.9	2.0
13	2.8	5.1	3.0	5.3	1.8	3.1	10.8	7.9	2.8	2.1	2.8	2.0
14	2.5	2.2	3.7	3.3	5.4	8.1	9.8	4.8	3.4	3.8	2.7	2.4
15	2.0	2.6	4.5	7.0	5.1	5.3	6.9	5.9	4.2	3.8	1.7	2.4
16	2.3	M	3.6	5.7	5.5	8.7	6.8	5.4	4.3	3.5	2.3	2.6
17	2.8	M	3.2	3.7	8.8	7.6	8.0	8.2	7.2	3.4	2.0	2.2
18	2.7	M	4.0	3.4	7.7	5.9	8.6	8.7	2.8	1.8	3.4	2.2
19	2.1	2.1	4.4	5.9	6.8	7.9	3.5	8.4	3.0	1.7	2.2	1.7
20	2.9	4.2	4.0	7.7	9.5	8.2	8.2	7.8	2.8	3.7	2.0	2.1

Note: M means missing values
* Converted from the integrated tape values (mv)

Table 26. (Continued)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
21	1.6	4.9	6.7	4.3	8.0	9.1	6.0	6.9	4.7	3.2	2.7	2.2
22	1.8	3.1	3.9	5.2	9.6	7.9	3.1	9.1	1.8	3.9	2.2	2.5
23	1.4	5.3	7.6	5.4	8.0	10.0	3.3	7.1	2.3	1.9	2.1	2.4
24	1.7	5.4	8.4	7.4	2.9	9.9	6.3	7.2	4.4	3.8	2.6	1.9
25	2.5	6.5	8.3	7.3	9.2	5.4	9.9	2.2	2.5	1.9	1.7	2.0
26	2.0	4.9	6.2	9.9	3.4	7.6	5.6	9.7	4.9	4.1	2.7	1.4
27	1.4	4.7	5.4	3.1	9.9	9.0	10.0	5.5	5.9	1.9	2.6	1.9
28	3.7	3.5	6.7	3.2	8.8	4.3	10.3	9.2	3.4	1.7	2.5	2.1
29	3.6		8.3	3.2	4.8	6.8	5.1	13.0	2.4	1.7	2.0	1.6
30	1.6		6.0	4.4	6.4	3.8	7.5	11.5	4.3	2.9	2.4	2.0
31	4.1		6.5		4.3		6.3	8.5		3.1		2.6
Total Diffuse	70.8	94.5	134.6	164.7	201.0	234.1	201.2	240.0	131.5	92.4	73.2	61.1

Note: M means missing values.
* Converted from the integrated tape values (mv)

Table 27. Global Solar Radiation (MJ m^{-2}) at Saskatoon SRC 1989.

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.4	10.1	15.5	19.5	25.9	17.5	M	20.6	18.1	7.4	8.9	6.4
2	6.0	9.6	14.3	18.3	21.8	24.1	M	25.7	10.6	12.2	5.6	6.8
3	7.0	9.9	16.2	19.7	21.9	29.4	M	19.8	15.3	15.9	8.9	3.9
4	5.1	9.3	16.2	17.6	21.4	20.1	M	18.4	20.9	15.1	4.1	4.5
5	3.9	7.5	13.6	16.6	27.8	22.9	24.8	22.3	13.2	15.5	5.7	3.9
6	5.8	7.8	14.5	17.0	25.0	9.2	25.3	26.2	10.1	15.1	8.4	6.4
7	6.4	11.0	14.4	15.5	17.1	25.4	27.1	25.5	M	12.5	5.2	4.1
8	4.1	11.4	14.6	22.2	23.4	26.0	22.4	23.6	M	12.2	6.1	3.6
9	7.6	10.8	12.4	23.3	22.0	21.6	24.9	24.1	14.4	14.1	7.9	4.7
10	7.9	11.2	6.5	18.2	14.5	13.5	10.7	17.3	13.2	6.4	4.9	6.9
11	6.5	11.4	8.6	23.0	25.6	15.1	16.1	25.8	18.1	13.5	8.8	4.7
12	6.6	10.7	15.9	19.3	9.8	26.9	15.8	23.4	19.6	14.0	5.8	4.9
13	5.5	9.6	17.9	16.9	4.5	32.1	24.1	22.8	19.3	13.3	7.0	4.6
14	5.1	13.7	17.6	23.7	8.4	28.5	22.8	23.8	18.7	6.4	5.2	5.2
15	8.4	13.1	18.5	14.5	27.0	27.6	25.9	24.1	17.5	7.3	9.4	4.8
16	6.7	M	17.4	24.0	10.9	12.8	25.1	8.9	17.8	9.9	4.8	6.1
17	5.4	M	18.7	24.6	23.5	26.0	19.0	18.5	10.8	11.9	8.6	6.4
18	6.1	M	18.8	24.0	15.3	29.0	25.7	16.4	5.3	13.3	6.8	6.5
19	7.8	12.6	17.9	21.4	22.5	25.7	28.8	13.4	18.1	12.6	6.9	4.6
20	7.3	11.6	19.2	18.1	14.6	26.9	24.2	19.3	17.6	10.3	7.0	6.7

Note: M means missing values

Table 27. (Continued)

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
21	7.4	11.3	18.8	23.8	24.3	20.2	25.0	20.7	17.4	9.9	5.4	8.2
22	8.6	13.9	18.8	9.5	22.4	17.9	26.2	18.3	18.6	9.3	6.6	5.5
23	8.7	8.1	10.8	8.7	19.5	24.2	29.1	20.6	17.1	11.3	7.5	5.0
24	9.7	10.6	14.9	12.5	5.5	22.3	24.9	10.1	16.2	10.0	5.2	6.1
25	8.4	10.8	12.9	22.8	16.2	8.4	20.5	4.8	17.2	9.7	4.2	4.5
26	8.5	13.5	8.9	20.9	29.0	26.3	28.2	17.5	15.1	6.6	5.6	6.4
27	8.8	13.1	7.6	26.5	22.4	25.5	21.4	8.3	11.9	4.5	5.3	4.5
28	7.5	15.0	9.5	26.3	27.1	29.7	15.3	16.1	14.8	4.4	5.2	4.6
29	6.1		14.9	26.8	30.5	26.0	27.0	18.0	15.9	10.8	7.6	6.3
30	4.1		17.9	25.3	26.2	29.6	24.9	17.0	13.4	5.4	6.6	6.6
31	6.9		19.0		30.2		23.0	11.8		5.7		6.6
Total	209.3	277.6	462.7	600.5	636.2	690.4	628.2	583.1	433.2	326.5	195.2	170.0

Note: M means missing values.

Table 28. Some Significant Climatic Events, 1989.

FROST FREE SEASON

	Last Spring Frost	First Fall Frost	Length of Season
1989	May 23	September 10	110
1988	May 2	September 19	139
1951-80 Normal	May 23	September 9	108

SNOW SEASON

Greatest Depth of Snow on Ground (cm)

	Jan.	Feb.	Mar.	Apr.	Oct.	Nov.	Dec.
1989	15	22	20	5	0	5	9
1988	10	12	19	0	0	6	10

	Cessation[1] of Snow Pack	Last Spring Snowfall	First Fall Snow	Onset[2] of Snow Pack
1989	April 9	April 7	October 14	November 12
1988	March 5	March 28	October 26	November 11

WEATHER "SPELLS" 3,4,5,6

	1989	1988
Longest Cool Spell	14 days Dec 9 -Dec 22	12 days Jan 30-Feb 10
Longest Cold Spell	6 days Dec 17-Dec 22	6 days Jan 31-Feb 5
Longest Warm Spell	11 days Jan 12-Jan 22	28 days May 15-June 12
Longest Hot Spell	5 days Aug 8-Aug 12	4 days June 3-June 6
Longest Dry Spell	14 days Oct 16-Oct 29	19 days Nov 18-Dec 6
Longest Wet Spell	10 days May 11-May 20	6 days Aug 18-Aug 23

[1]First day on the first interval of at least 5 days duration in which snow cover is reduced to less than 1 cm depth.

[2]First day on the first interval of at least 5 days duration in which snow cover equals or exceeds 1 cm depth.

[3]Temperature "spells" are defined as a sequence of days when the daily mean temperature during the year in question is higher (warm spell) or lower (cold spell) than the long-term daily mean for the date in question.

[4]Precipitation "spells" are defined as the sequence of days with precipitation amounts greater than trace (wet spells) or precipitation amounts of trace or less (dry spells).

[5]A cold spell refers to the number of consecutive days with minimum temperatures less than or equal to -30°C.

[6]A hot spell refers to the number of consecutive days with maximum temperatures equal to or greater than 30°C.

Table 29. Times of Sunrise at Saskatoon, 1989 (local time).

DATE	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	9.15	8.48	7.53	6.42	5.37	4.52	4.50	5.27	6.17	7.07	8.01	8.52
2	9.15	8.46	7.51	6.40	5.35	4.51	4.51	5.29	6.19	7.09	8.03	8.54
3	9.15	8.44	7.49	6.38	5.33	4.50	4.51	5.30	6.21	7.10	8.05	8.55
4	9.15	8.43	7.47	6.35	5.31	4.50	4.52	5.32	6.22	7.12	8.07	8.56
5	9.15	8.41	7.45	6.33	5.29	4.49	4.53	5.34	6.24	7.14	8.08	8.58
6	9.14	8.39	7.42	6.31	5.28	4.48	4.54	5.35	6.26	7.15	8.10	8.59
7	9.14	8.38	7.40	6.28	5.26	4.48	4.55	5.37	6.27	7.17	8.12	9.00
8	9.13	8.36	7.38	6.26	5.24	4.47	4.56	5.38	6.29	7.19	8.14	9.01
9	9.13	8.34	7.35	6.24	5.22	4.47	4.57	5.40	6.31	7.20	8.16	9.03
10	9.12	8.32	7.33	6.22	5.21	4.46	4.58	5.42	6.32	7.22	8.17	9.04
11	9.12	8.30	7.31	6.19	5.19	4.46	4.59	5.43	6.34	7.24	8.19	9.05
12	9.11	8.28	7.29	6.17	5.17	4.46	5.00	5.45	6.35	7.26	8.21	9.06
13	9.10	8.27	7.26	6.15	5.16	4.46	5.01	5.46	6.37	7.27	8.23	9.07
14	9.09	8.25	7.24	6.13	5.14	4.45	5.02	5.48	6.39	7.29	8.24	9.08
15	9.09	8.23	7.22	6.10	5.13	4.45	5.03	5.50	6.40	7.31	8.26	9.09
16	9.08	8.21	7.19	6.08	5.11	4.45	5.05	5.51	6.42	7.33	8.28	9.09
17	9.07	8.19	7.17	6.06	5.10	4.45	5.06	5.53	6.44	7.34	8.30	9.10
18	9.06	8.17	7.15	6.04	5.08	4.45	5.07	5.55	6.45	7.36	8.31	9.11
19	9.05	8.15	7.12	6.02	5.07	4.45	5.08	5.56	6.47	7.38	8.33	9.12
20	9.04	8.13	7.10	6.00	5.05	4.45	5.10	5.58	6.49	7.40	8.35	9.12
21	9.03	8.11	7.08	5.57	5.04	4.45	5.11	5.59	6.50	7.41	8.37	9.13
22	9.01	8.08	7.05	5.55	5.03	4.46	5.13	6.01	6.52	7.43	8.38	9.13
23	9.00	8.06	7.03	5.53	5.01	4.46	5.14	6.03	6.54	7.45	8.40	9.14
24	8.59	8.04	7.01	5.51	5.00	4.46	5.15	6.04	6.55	7.47	8.42	9.14
25	8.58	8.02	6.58	5.49	4.59	4.47	5.17	6.06	6.57	7.48	8.43	9.15
26	8.56	8.00	6.56	5.47	4.58	4.47	5.18	6.08	6.59	7.50	8.45	9.15
27	8.55	7.59	6.54	5.45	4.57	4.48	5.20	6.09	7.00	7.52	8.46	9.15
28	8.54	7.56	6.51	5.43	4.56	4.48	5.21	6.11	7.02	7.54	8.48	9.15
29	8.52	0.00	6.49	5.41	4.55	4.49	5.23	6.13	7.04	7.56	8.49	9.15
30	8.51	0.00	6.47	5.39	4.54	4.49	5.24	6.14	7.05	7.57	8.51	9.16
31	8.49	0.00	6.44	0.00	4.53	0.00	5.26	6.16	0.00	7.59	0.00	9.16

Table 30. Time of Sunset at Saskatoon, 1989 (local time)

DATE	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	17.04	17.53	18.45	19.39	20.30	21.17	21.31	20.59	19.56	18.46	17.39	16.59
2	17.05	17.54	18.46	19.41	20.32	21.18	21.30	20.57	19.54	18.44	17.37	16.58
3	17.07	17.56	18.48	19.42	20.34	21.19	21.30	20.55	19.51	18.41	17.36	16.57
4	17.08	17.58	18.50	19.44	20.35	21.20	21.30	20.53	19.49	18.39	17.34	16.57
5	17.09	18.00	18.52	19.46	20.37	21.21	21.29	20.52	19.47	18.37	17.32	16.56
6	17.10	18.02	18.54	19.48	20.39	21.22	21.29	20.50	19.44	18.34	17.30	16.56
7	17.11	18.04	18.55	19.49	20.40	21.23	21.28	20.48	19.42	18.32	17.29	16.55
8	17.13	18.06	18.57	19.51	20.42	21.24	21.27	20.46	19.40	18.30	17.27	16.55
9	17.14	18.08	18.59	19.53	20.44	21.24	21.27	20.44	19.38	18.27	17.25	16.55
10	17.16	18.09	19.01	19.54	20.45	21.25	21.26	20.42	19.35	18.25	17.24	16.55
11	17.17	18.11	19.03	19.56	20.47	21.26	21.25	20.41	19.33	18.23	17.22	16.54
12	17.18	18.13	19.04	19.58	20.49	21.27	21.24	20.39	19.31	18.21	17.20	16.54
13	17.20	18.15	19.06	20.00	20.50	21.27	21.23	20.37	19.28	18.19	17.19	16.54
14	17.21	18.17	19.08	20.01	20.52	21.28	21.22	20.35	19.26	18.16	17.17	16.54
15	17.23	18.19	19.10	20.03	20.53	21.29	21.21	20.33	19.23	18.14	17.16	16.54
16	17.25	18.21	19.11	20.05	20.55	21.29	21.20	20.31	19.21	18.12	17.15	16.54
17	17.26	18.23	19.13	20.07	20.56	21.30	21.19	20.29	19.19	18.10	17.13	16.55
18	17.28	18.24	19.15	20.08	20.58	21.30	21.18	20.26	19.16	18.08	17.12	16.55
19	17.30	18.26	19.17	20.10	20.59	21.30	21.17	20.24	19.14	18.05	17.11	16.55
20	17.31	18.28	19.18	20.12	21.01	21.31	21.16	20.22	19.12	18.03	17.09	16.56
21	17.33	18.30	19.20	20.13	21.02	21.31	21.15	20.20	19.09	18.01	17.08	16.56
22	17.35	18.32	19.22	20.15	21.04	21.31	21.13	20.18	19.07	17.59	17.07	16.56
23	17.36	18.34	19.24	20.17	21.05	21.31	21.12	20.16	19.05	17.57	17.06	16.57
24	17.38	18.35	19.25	20.18	21.06	21.31	21.11	20.14	19.02	17.55	17.05	16.58
25	17.40	18.37	19.27	20.20	21.08	21.32	21.09	20.12	19.00	17.53	17.04	16.58
26	17.42	18.39	19.29	20.22	21.09	21.32	21.08	20.09	18.58	17.51	17.03	16.59
27	17.43	18.41	19.30	20.24	21.10	21.31	21.06	20.07	18.55	17.49	17.02	17.00
28	17.45	18.43	19.32	20.25	21.12	21.31	21.05	20.05	18.53	17.47	17.01	17.00
29	17.47	0.00	19.34	20.27	21.13	21.31	21.03	20.03	18.51	17.45	17.00	17.01
30	17.49	0.00	19.36	20.29	21.14	21.31	21.02	20.00	18.48	17.43	16.59	17.02
31	17.51	0.00	19.37	0.00	21.15	0.00	21.00	19.58	0.00	17.41	0.00	17.03

Figure 1. Year 1989 Daily Temperature and Cumulative Precipitation

In order to present the maximum length of climatic record for the Saskatoon area, data from several sources have been pooled to produce the historic record shown in this figure. For data sources please refer to Footnotes for Climatic Tables, note 3. The seasons shown are defined on an astronomical basis.

YEAR 1989

DAILY TEMPERATURE AND ACCUMULATIVE PRECIPITATION

SASKATOON SRC (52°09'N, 106°36'W, 497m MSL)

SPRING

AUTUMN

TEMPERATURE (°C)

ACCUMULATIVE PRECIPITATION (MM)

JANUARY FEBRUARY MARCH APRIL MAY JUNE JULY AUGUST SEPTEMBER OCTOBER NOVEMBER DECEMBER

LEGEND

TEMPERATURE

- EXTREME MAXIMUM TEMPERATURE - PERIOD 1892-1988
- MEAN DAILY MAXIMUM TEMPERATURE - PERIOD 1916-1975
- MEAN DAILY TEMPERATURE FOR THE PERIOD 1892-1970
- MEAN DAILY MINIMUM TEMPERATURE - PERIOD 1916-1975
- EXTREME MINIMUM TEMPERATURE - PERIOD 1892-1988
- DAILY TEMPERATURE FOR CURRENT YEAR

PRECIPITATION

- ALL TIME RECORD MAXIMUM YEARLY TOTAL PRECIPITATION - YEAR 1942
- NORMAL YEARLY TOTAL PRECIPITATION FOR PERIOD 1902 - 1974
- ALL TIME RECORD MINIMUM YEARLY TOTAL PRECIPITATION - YEAR 1961 (1 of 5 Pry.)
- CURRENT TOTAL PRECIPITATION